



Heavy metal content of selected personal care products (PCPs) available in Ibadan, Nigeria and their toxic effects



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ABSTRACT

There is a growing concern on heavy metals in consumer products due to their potential human health risks and environmental effects. In this study, the levels of zinc, cadmium, lead and nickel were assessed in 3 different classes of personal care products commonly used in Ibadan, Nigeria. Samples were analysed for heavy metals using Atomic Absorption Spectrophotometer (AAS) after acid digestion. Estimated daily intake (EDI) of the metals and Health Risk Index (HRI) were calculated to assess the human health risks associated with the use of these PCPs. The concentrations (mg/kg) of zinc ranged from 3.75 to 19.3, 1.88 to 112,000 and 19.8 to 217 respectively in creams, powders and eyeliners. Cadmium ranged from ND–0.50, ND–36.3 and ND–0.50 mg/kg while lead ranged from ND–6.25, ND–468 and 3.73–27.5 mg/kg and nickel ranged from ND–6.25, 0.13–107 and 2.75–22.7 mg/kg respectively. There were high concentrations of Cd, Pb and Ni in some of the samples when compared with the available permissible limits in cosmetics (Cd: 0.3 ppm, Pb: 10 ppm and Ni: 0.6 ppm while there is no permissible limit for Zn in cosmetics currently available). Prolonged use of PCPs may pose human health and environmental risks due to toxic metal loading through dermal contact and accumulation over a period of time. Hence, the need for necessary government agencies to regulate and enforce toxic metals in consumer products including cosmetics produced and imported into Nigeria to safeguard public health and the environment, which is the final sink.

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1. Introduction

The quest for physical beauty by more people has promoted the use of personal care products (PCPs) globally. Millions of people use one or two types of PCPs and their ingredients on a daily basis [1]. This, of course, exposes them to different chemicals contained in the PCPs via direct skin contact which often involves exposure of a large area of the body. This is coupled with prolonged duration of contact, which may occur due to repeated use of the products [33]. There are different types of PCPs which include lipstick and lip gloss (used to colour the lips); powder and rouge (used to colour the face, lighten and remove flaws); mascara, eyeliners and eye-shadow (used to colour the eyelids); nail polish (used to colour the fingernails and toenails) and different types of both moisturizing and lightening/toning creams [58].

Studies have described human exposure to heavy metals from different sources in Nigeria [63,54,6,53,38,48,47,68,4], but little is

known about human exposure to heavy metals contained in PCPs [11,2,8,44,5,46,24,52,69,27] and the associated human health risks. Data on the exposure of humans to metal toxins through dermal contact is very scanty. There is equally a paucity of data on the concentrations of cadmium, nickel, lead, and zinc in PCPs commonly available and used in Ibadan, Nigeria and their potential human health risk. At high concentrations, some of the metals may damage the internal body organs in animals and humans. Various forms of mammalian cancers, respiratory diseases, organ failure and learning disabilities had been traced to metal poisoning [39,40,32]; and [59].

Chronic exposure to cadmium causes kidney dysfunction and high levels of exposure will result in death [18,55,3,26,29]. Zinc has been reported to cause the same illness as lead [36], and can cause other health problems such as stomach cramps, vomiting, nausea, skin irritation, and anemia [55]. Other health effects associated with cadmium, copper and zinc poisoning includes gastrointestinal disorder, diarrhea, stomatitis, tremor, ataxia, paralysis, vomiting and convulsion, depression, and pneumonia [37,22,39]. Nickel is a human carcinogen that can lead to kidney problems, gastrointestinal distress, pulmonary fibrosis and skin dermatitis [18].

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Table 1

List of some PCPs (creams and powders) commonly used in Ibadan, Nigeria.

S/N	Sample code	Names of PCPs	Names of manufacturer	Country of manufacture	NAFDAC reg. No	Date of manufacture	Expiry date	Quantity in pack
		Creams						
01	01CC	Skin perfection	Zenon Laboratories and Chemicals Ind. Ltd.	Lagos, Nigeria	02–1587	April 2014	April 2017	150 mL
02	02CC	Balila Beauty cream	Geydekosoun Nig. Ltd.	Lagos, Nigeria	02–3831	March 2014	March 2017	150 mL
03	03CC	Cussons baby Jelly	PZ cussons Nig. Plc	Ibadan, Nigeria	02–3811	March 2014	February 2017	90 g
04	04CC	Caro white	Dream cosmetic	Abidjan 23, Cole de' voire	LOT: 13/7606:13	February 2014	February 2016	50 mL
05	05CC	Authentic herbal cream	Bright Future Hope Ent.	Nigeria	04-8617L	April 2014	March 2018	
06	06CC	Peau Claire	SIVOP perfume and cosmetiques	Lagos, Nigeria	02–7756	March 2014	March 2016	150 mL
07	07CC	Baby and me Jelly	Aspira Nig. Ltd.	Kano, Nigeria	02–5979	February 2013	February 2018	150 g
08	08CC	Zenon cocoa butter body cream	Zenon Laboratories and Chemical Industries	Lagos, Nigeria	02–5642	May 2014	May 2017	150 g
09	09CC	Cocoderm	Sivop Perfume and Cosmetics	Lagos, Nigeria	02–6990	May 2014	May 2016	300 mL
10	10CC	Clair- Liss	Sivop Perfume and Cosmetics	Lagos, Nigeria	02–1510	June 2014	June 2016	150 mL
11	11CC	Vaseline blue seal	Unilever South Africa (pty) Ltd.	South Africa	02–0385	September 2013	September 2016	50 mL
12	12CC	Tony Montana	Gey de Kognogn Nigeria	Lagos, Nigeria	02–1310	July 2014	July 2016	150 g
13	13CC	Cacatin Herbal Antiseptic Cream	layus Investment Ltd.	Lagos, Nigeria	04–8701	August 2014	July 2017	50 g
14	14CC	Nouveaute	Gey de Kognogn Nigeria	Lagos, Nigeria	02–1291	June 2014	June 2017	75 g
15	15CC	Dettol	Cybele Cosmetic Ltd.	Lagos, Nigeria	02–6942	May 2014	May 2016	40 g
16	16CC	Drya's Sporting Wave Hair Cream		Nigeria	1B-0832L	November 2012	November 2016	115 g
17	17CC	Zoleen Hair Cream	Jabman Industries Ltd.	Lagos, Nigeria	02–3209	August 2011	July 2016	50 g
18	18CC	Golden Perfume Baby Jelly	Ebesun Company Nig. Ltd.	Lagos, Nigeria	02-0029L	March 2014	June 2016	80 g
19	19CC	Debby Baby Jelly	Ejyson Ind. Ltd.	Ibadan, Nigeria		November 2012	November 2014	80 g
20	20CC	Sweet mother Jelly	Stico laboratory Ltd.	Lagos, Nigeria	02–1739	November 2013	November 2017	80 g
		Powders						
01	01PP	Passion Talcum powder	Cybele cosmetics Ltd.	Lagos, Nigeria	02–1434	May 2014	May 2017	30 g
02	002PP	April Beauty Talc	Negatrex Nig. Ltd.	Lagos, Nigeria	02–6634	March 2014	March 2017	100 g
03	003PP	Mp3Cool Refreshing powder	Imperio Int. Ltd.	Lagos, Nigeria	02–5729	May 2014	May 2017	100 g
04	04PP	Salga Cool Refreshing Talcum powder	Imperio Int. Ltd.	Lagos, Nigeria	02–8492	May 2014	May 2017	100 g
05	05PP	MYK flower face powder	MYK cosmetics Ltd.	Lagos, Nigeria		July 2014	June 2017	50 g
06	06PP	Balila powder	Grey de Kourou GDK	Lagos, Nigeria	02–3830	April 2014	April 2017	50 g
07	07PP	Rising Raving baby powder	Rising Ventures	Edo state, Nigeria	004	April 2014	March 2018	100 g
08	08PP	MYK Lilo baby powder	MYK cosmetics Ltd.	Lagos, Nigeria	02–6599	August 2014	July 2017	–
09	09PP	POP facial powder	Corporative Beauty Nig. Ltd.	Nigeria				30 g
10	10PP	Euchauteur powder	UNZA Singapore Ltd.	Malaysia	02.1392	December 2013	December 2016	125 g

Note: Reg. = registration.

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